

Chapter 2

Global E-business and Collaboration

LEARNING OBJECTIVES

After reading this chapter, you will be able to answer the following questions:

1. What are business processes? How are they related to information systems?
2. How do systems serve the different management groups in a business?
3. How do systems that link the enterprise improve organizational performance?
4. Why are systems for collaboration and teamwork so important and what technologies do they use?
5. What is the role of the information systems function in a business?

Interactive Sessions:

Domino's Sizzles with Pizza Tracker

Virtual Meetings: Smart Management

CHAPTER OUTLINE

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Business Processes

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AMERICA'S CUP 2010: USA WINS WITH INFORMATION TECHNOLOGY

The BMW Oracle Racing organization won the 33rd America's Cup yacht race in Valencia, Spain on February 18, 2010. The BMW Oracle boat USA, backed by software billionaire Larry Ellison, beat Alinghi, the Swiss boat backed by Ernesto Bertarelli, a Swiss billionaire. It's always a spectacle when two billionaires go head to head for the prize. Lots and lots of money, world-class talent, and in this case, the best technologies and information systems in the world. In the end, the 114-foot USA won handily the first two races of a best-of-three series, reaching speeds over 35 miles an hour, three times faster than the wind. As far as experts can figure, USA is the fastest sailboat in history.

So what kind of technology can you get for a \$300 million sailboat? Start with the physical structure: a three hulled trimaran, 114 feet long, fashioned from carbon fiber shaped into a form descended from Polynesian outrigger boats over a thousand years old. The hull is so light it only extends six inches into the water. Forget about a traditional mast (that's the pole that holds up the sails) and forget about sails too. Think about a 233-foot airplane wing also made from carbon fiber that sticks up from the boat deck 20 stories high. Instead of cloth sails, think about a stretchy aeronautical fabric over a carbon fiber frame that is hydraulically controlled to assume any shape you want, sort of like a stretchy garment hugs the body's bones. The result is a wing, not a sail, whose shape can be changed from pretty near flat to quite curved just like an aircraft wing.

Controlling this wickedly sleek sailboat requires a lightning-fast collection of massive amounts of data, powerful data management, rapid real-time data analysis, quick decision making, and immediate measurement of the results. In short, all the information technologies needed by a modern business firm. When you can perform all these tasks thousands of times in an hour, you can incrementally improve your performance and have an overwhelming advantage over less IT-savvy opponents on race day.

For USA, this meant using 250 sensors on the wing, hull, and rudder to gather real-time data on pressure, angles, loads, and strains to monitor the effectiveness of each adjustment. The sensors track 4,000 variables, 10 times a second, producing 90 million data points an hour.

Managing all these data is Oracle Database 11g data management software. The data are wirelessly transferred to a tender ship running Oracle 11g for near real-time analysis using a family of formulas (called velocity prediction formulas) geared to understanding what makes the boat go fast. Oracle's Application Express presentation graphics summarize the millions of data points and present the boat managers with charts that make sense of the information. The data are also sent to Oracle's Austin data center for more in-depth analysis. Using powerful data analysis tools, USA managers were able to find relationships they had never thought about before. Over several years of practice, from day one to the day before the race, the crew of USA could chart a steady improvement in performance.

All this meant "sailing" had changed, perhaps been trans-



formed by IT. Each crew member wore a small mobile handheld computer on his wrist to display data on the key performance variables customized for that person’s responsibilities, such as the load balance on a specific rope or the current aerodynamic performance of the wing sail. Rather than stare at the sails or the sea, the crew had to be trained to sail like pilots looking at instruments. The helmsman turned into a pilot looking at data displayed on his sunglasses with an occasional glance at the deck crew, sea state, and competitors.

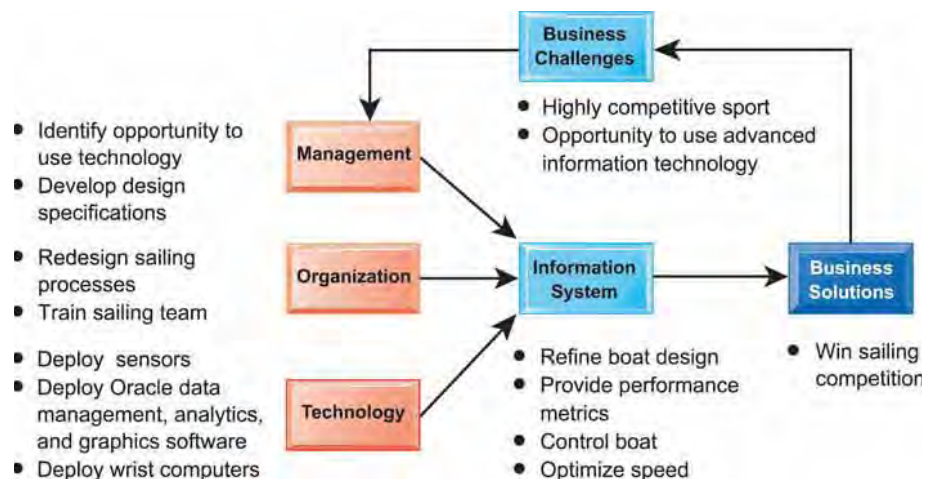
Professional and amateur sailors across the world wondered if the technology had transformed sailing into something else. The billionaire winner Larry Ellison sets the rules for the next race, and the blogs are speculating that he will seek a return to simpler more traditional boats that need to be sailed, not flown like air-planes. Yet few really believe Ellison will give up a key IT advantage in data collection, analysis, presentation, and performance-based decision making.

Sources: Jeff Erickson, “Sailing Home with the Prize,” *Oracle Magazine*, May/June 2010; www.america’s cup.com, accessed May 21,2010; and www.bmworacleracing.com, accessed May 21, 2010.

The experience of BMW Oracle’s USA in the 2010 America’s Cup competition illustrates how much organizations today, even those in traditional sports such as sailing, rely on information systems to improve their performance and remain competitive. It also shows how much information systems make a difference in an organization’s ability to innovate, execute, and in the case of business firms, grow profits.

The chapter-opening diagram calls attention to important points raised by this case and this chapter. The America’s Cup contenders were confronted with both a challenge and opportunity. Both were locked in the world’s most competitive sailing race. They staffed their crews with the best sailors in the world. But sailing ability was not enough. There were opportunities for improving sailing performance by changing and refining the design of the competing vessels using information systems intensively for this purpose.

Because Oracle is one of the world’s leading information technology providers, the company was a natural for using the most advanced information technology to continually improve USA’s design and performance. But information technology alone would not have produced a winning boat. The Oracle team had to revise many of the processes and procedures used in sailing to take advantage of the technology, including training experienced sailors to work more like pilots with high-tech instruments and sensors. Oracle won the America’s Cup because it had learned how to apply new technology to improve the processes of designing and sailing a competitive sailboat.



2.1 BUSINESS PROCESSES AND INFORMATION SYSTEMS

In order to operate, businesses must deal with many different pieces of information about suppliers, customers, employees, invoices and payments, and of course their products and services. They must organize work activities that use this information to operate efficiently and enhance the overall performance of the firm. Information systems make it possible for firms to manage all their information, make better decisions, and improve the execution of their business processes.

BUSINESS PROCESSES

Business processes, which we introduced in Chapter 1, refer to the manner in which work is organized, coordinated, and focused to produce a valuable product or service. Business processes are the collection of activities required to produce a product or service. These activities are supported by flows of material, information, and knowledge among the participants in business processes. Business processes also refer to the unique ways in which organizations coordinate work, information, and knowledge, and the ways in which management chooses to coordinate work.

To a large extent, the performance of a business firm depends on how well its business processes are designed and coordinated. A company's business processes can be a source of competitive strength if they enable the company to innovate or to execute better than its rivals. Business processes can also be liabilities if they are based on outdated ways of working that impede organizational responsiveness and efficiency. The chapter-opening case describing the processes used to sail the 2010 winning America's Cup boat clearly illustrates these points, as do many of the other cases in this text.

Every business can be seen as a collection of business processes, some of which are part of larger encompassing processes. For instance, designing a new sailboat model, manufacturing components, assembling the finished boat, and revising the design and construction are all part of the overall production process. Many business processes are tied to a specific functional area. For example, the sales and marketing function is responsible for identifying customers, and the human resources function is responsible for hiring employees. Table 2-1 describes some typical business processes for each of the functional areas of business.

TABLE 2-1 EXAMPLES OF FUNCTIONAL BUSINESS PROCESSES

FUNCTIONAL AREA	BUSINESS PROCESS
Manufacturing and production	Assembling the product Checking for quality Producing bills of materials
Sales and marketing	Identifying customers Making customers aware of the product Selling the product
Finance and accounting	Paying creditors Creating financial statements Managing cash accounts
Human resources	Hiring employees Evaluating employees' job performance Enrolling employees in benefits plans

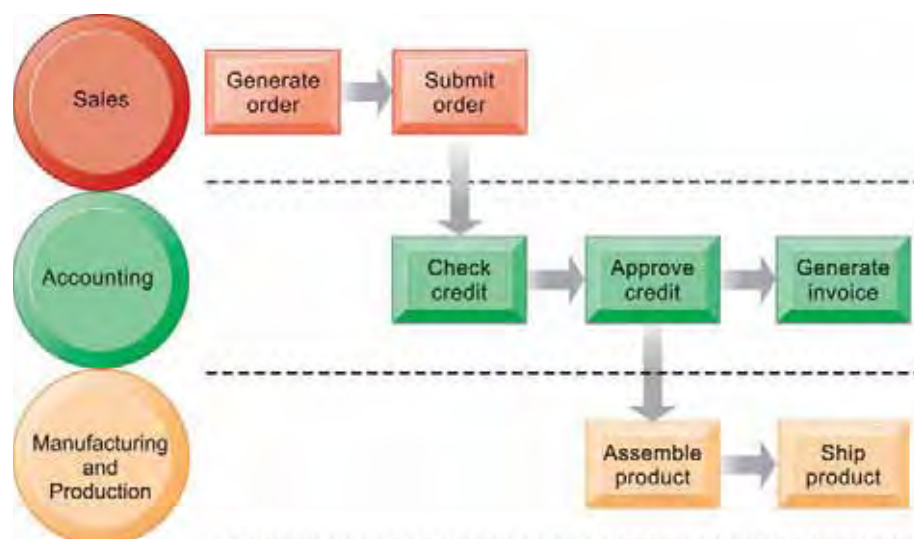
Other business processes cross many different functional areas and require coordination across departments. For instance, consider the seemingly simple business process of fulfilling a customer order (see Figure 2-1). Initially, the sales department receives a sales order. The order passes first to accounting to ensure the customer can pay for the order either by a credit verification or request for immediate payment prior to shipping. Once the customer credit is established, the production department pulls the product from inventory or produces the product. Then the product is shipped (and this may require working with a logistics firm, such as UPS or FedEx). A bill or invoice is generated by the accounting department, and a notice is sent to the customer indicating that the product has shipped. The sales department is notified of the shipment and prepares to support the customer by answering calls or fulfilling warranty claims.

What at first appears to be a simple process, fulfilling an order, turns out to be a very complicated series of business processes that require the close coordination of major functional groups in a firm. Moreover, to efficiently perform all these steps in the order fulfillment process requires a great deal of information. The required information must flow rapidly both within the firm from one decision maker to another; with business partners, such as delivery firms; and with the customer. Computer-based information systems make this possible.

HOW INFORMATION TECHNOLOGY IMPROVES BUSINESS PROCESSES

Exactly how do information systems improve business processes? Information systems automate many steps in business processes that were formerly performed manually, such as checking a client's credit, or generating an invoice and shipping order. But today, information technology can do much more. New technology can actually change the flow of information, making it possible for many more people to access and share information, replacing sequential steps

FIGURE 2-1 THE ORDER FULFILLMENT PROCESS



Fulfilling a customer order involves a complex set of steps that requires the close coordination of the sales, accounting, and manufacturing functions.

with tasks that can be performed simultaneously, and eliminating delays in decision making. New information technology frequently changes the way a business works and supports entirely new business models. Downloading a Kindle e-book from Amazon, buying a computer online at Best Buy, and downloading a music track from iTunes are entirely new business processes based on new business models that would be inconceivable without today's information technology.

That's why it's so important to pay close attention to business processes, both in your information systems course and in your future career. By analyzing business processes, you can achieve a very clear understanding of how a business actually works. Moreover, by conducting a business process analysis, you will also begin to understand how to change the business by improving its processes to make it more efficient or effective. Throughout this book, we examine business processes with a view to understanding how they might be improved by using information technology to achieve greater efficiency, innovation, and customer service.

2.2 TYPES OF INFORMATION SYSTEMS

Now that you understand business processes, it is time to look more closely at how information systems support the business processes of a firm. Because there are different interests, specialties, and levels in an organization, there are different kinds of systems. No single system can provide all the information an organization needs.

A typical business organization has systems supporting processes for each of the major business functions—systems for sales and marketing, manufacturing and production, finance and accounting, and human resources. You can find examples of systems for each of these business functions in the Learning Tracks for this chapter. Functional systems that operate independently of each other are becoming a thing of the past because they cannot easily share information to support cross-functional business processes. Many have been replaced with large-scale cross-functional systems that integrate the activities of related business processes and organizational units. We describe these integrated cross-functional applications later in this section.

A typical firm also has different systems supporting the decision-making needs of each of the main management groups we described in Chapter 1. Operational management, middle management, and senior management each use systems to support the decisions they must make to run the company. Let's look at these systems and the types of decisions they support.

SYSTEMS FOR DIFFERENT MANAGEMENT GROUPS

A business firm has systems to support different groups or levels of management. These systems include transaction processing systems, management information systems, decision-support systems, and systems for business intelligence.

Transaction Processing Systems

Operational managers need systems that keep track of the elementary activities and transactions of the organization, such as sales, receipts, cash deposits, payroll, credit decisions, and the flow of materials in a factory. **Transaction**

processing systems (TPS) provide this kind of information. A transaction processing system is a computerized system that performs and records the daily routine transactions necessary to conduct business, such as sales order entry, hotel reservations, payroll, employee record keeping, and shipping.

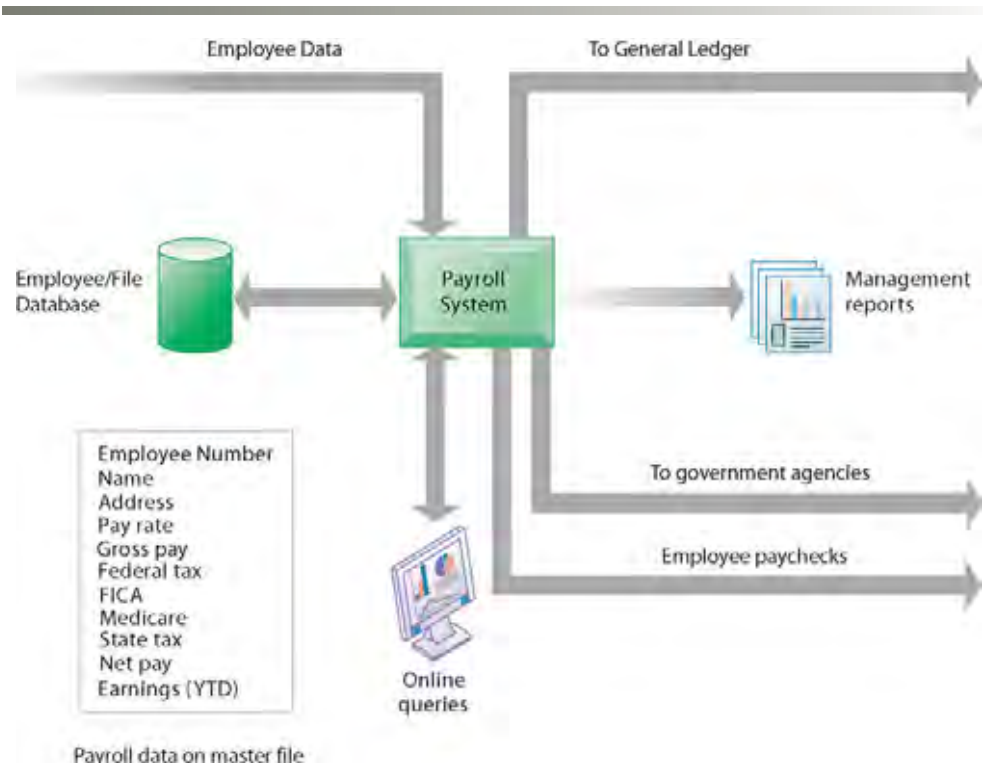
The principal purpose of systems at this level is to answer routine questions and to track the flow of transactions through the organization. How many parts are in inventory? What happened to Mr. Smith’s payment? To answer these kinds of questions, information generally must be easily available, current, and accurate.

At the operational level, tasks, resources, and goals are predefined and highly structured. The decision to grant credit to a customer, for instance, is made by a lower-level supervisor according to predefined criteria. All that must be determined is whether the customer meets the criteria.

Figure 2-2 illustrates a TPS for payroll processing. A payroll system keeps track of money paid to employees. An employee time sheet with the employee’s name, social security number, and number of hours worked per week represents a single transaction for this system. Once this transaction is input into the system, it updates the system’s master file (or database—see Chapter 6) that permanently maintains employee information for the organization. The data in the system are combined in different ways to create reports of interest to management and government agencies and to send paychecks to employees.

Managers need TPS to monitor the status of internal operations and the firm’s relations with the external environment. TPS are also major producers of information for the other systems and business functions. For example, the payroll system illustrated in Figure 2-2, along with other accounting TPS,

FIGURE 2-2 A PAYROLL TPS



A TPS for payroll processing captures employee payment transaction data (such as a time card). System outputs include online and hard-copy reports for management and employee paychecks.

supplies data to the company's general ledger system, which is responsible for maintaining records of the firm's income and expenses and for producing reports such as income statements and balance sheets. It also supplies employee payment history data for insurance, pension, and other benefits calculations to the firm's human resources function and employee payment data to government agencies such as the U.S. Internal Revenue Service and Social Security Administration.

Transaction processing systems are often so central to a business that TPS failure for a few hours can lead to a firm's demise and perhaps that of other firms linked to it. Imagine what would happen to UPS if its package tracking system were not working! What would the airlines do without their computerized reservation systems?

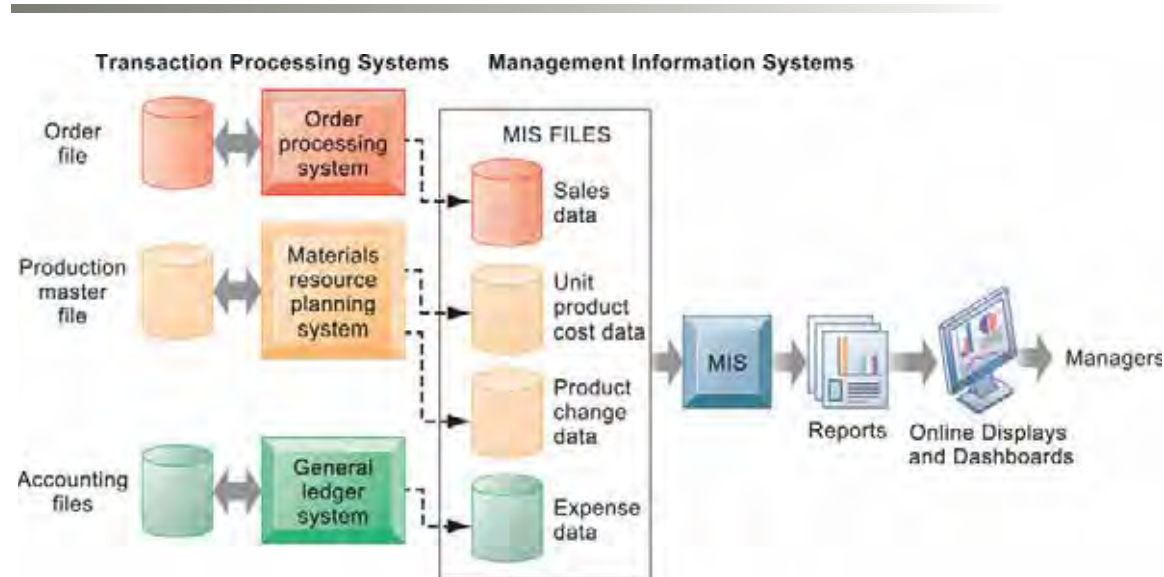
Business Intelligence Systems for Decision Support

Middle management needs systems to help with monitoring, controlling, decision-making, and administrative activities. The principal question addressed by such systems is this: Are things working well?

In Chapter 1, we define management information systems as the study of information systems in business and management. The term **management information systems (MIS)** also designates a specific category of information systems serving middle management. MIS provide middle managers with reports on the organization's current performance. This information is used to monitor and control the business and predict future performance.

MIS summarize and report on the company's basic operations using data supplied by transaction processing systems. The basic transaction data from TPS are compressed and usually presented in reports that are produced on a regular schedule. Today, many of these reports are delivered online. Figure 2-3 shows how a typical MIS transforms transaction-level data from order process-

FIGURE 2-3 HOW MANAGEMENT INFORMATION SYSTEMS OBTAIN THEIR DATA FROM THE ORGANIZATION'S TPS



In the system illustrated by this diagram, three TPS supply summarized transaction data to the MIS reporting system at the end of the time period. Managers gain access to the organizational data through the MIS, which provides them with the appropriate reports.

ing, production, and accounting into MIS files that are used to provide managers with reports. Figure 2-4 shows a sample report from this system.

MIS serve managers primarily interested in weekly, monthly, and yearly results. These systems typically provide answers to routine questions that have been specified in advance and have a predefined procedure for answering them. For instance, MIS reports might list the total pounds of lettuce used this quarter by a fast-food chain or, as illustrated in Figure 2-4, compare total annual sales figures for specific products to planned targets. These systems generally are not flexible and have little analytical capability. Most MIS use simple routines, such as summaries and comparisons, as opposed to sophisticated mathematical models or statistical techniques.

In contrast, **decision-support systems (DSS)** support more non-routine decision making. They focus on problems that are unique and rapidly changing, for which the procedure for arriving at a solution may not be fully predefined in advance. They try to answer questions such as these: What would be the impact on production schedules if we were to double sales in the month of December? What would happen to our return on investment if a factory schedule were delayed for six months?

Although DSS use internal information from TPS and MIS, they often bring in information from external sources, such as current stock prices or product prices of competitors. These systems use a variety of models to analyze the data and are designed so that users can work with them directly.

An interesting, small, but powerful, DSS is the voyage-estimating system of a subsidiary of a large American metals company that exists primarily to carry bulk cargoes of coal, oil, ores, and finished products for its parent company. The firm owns some vessels, charters others, and bids for shipping contracts in the open market to carry general cargo. A voyage-estimating system calculates financial and technical voyage details. Financial calculations include ship/time costs (fuel, labor, capital), freight rates for various types of cargo, and port expenses. Technical details include a myriad of factors, such as ship cargo capacity, speed, port distances, fuel and water consumption, and loading patterns (location of cargo for different ports).

FIGURE 2-4 SAMPLE MIS REPORT

Consolidated Consumer Products Corporation Sales by Product and Sales Region: 2011

PRODUCT CODE	PRODUCT DESCRIPTION	SALES REGION	ACTUAL SALES	PLANNED	ACTUAL versus PLANNED
4469	Carpet Cleaner	Northeast	4,066,700	4,800,000	0.85
		South	3,778,112	3,750,000	1.01
		Midwest	4,867,001	4,600,000	1.06
		West	4,003,440	4,400,000	0.91
		TOTAL		16,715,253	17,550,000
5674	Room Freshener	Northeast	3,676,700	3,900,000	0.94
		South	5,608,112	4,700,000	1.19
		Midwest	4,711,001	4,200,000	1.12
		West	4,563,440	4,900,000	0.93
		TOTAL		18,559,253	17,700,000

This report, showing summarized annual sales data, was produced by the MIS in Figure 2-3.

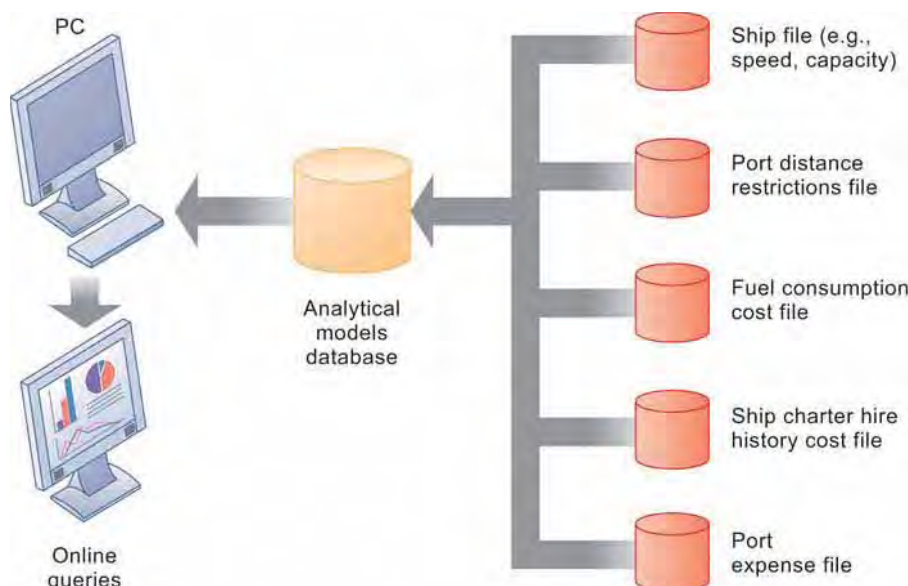
The system can answer questions such as the following: Given a customer delivery schedule and an offered freight rate, which vessel should be assigned at what rate to maximize profits? What is the optimal speed at which a particular vessel can maximize its profit and still meet its delivery schedule? What is the optimal loading pattern for a ship bound for the U.S. West Coast from Malaysia? Figure 2-5 illustrates the DSS built for this company. The system operates on a desktop personal computer, providing a system of menus that makes it easy for users to enter data or obtain information.

The voyage-estimating DSS we have just described draws heavily on models. Other systems supporting non-routine decision making are more data-driven, focusing instead on extracting useful information from large quantities of data. For example, Intrawest—the largest ski operator in North America—collects and stores large amounts of customer data from its Web site, call center, lodging reservations, ski schools, and ski equipment rental stores. It uses special software to analyze these data to determine the value, revenue potential, and loyalty of each customer so managers can make better decisions on how to target their marketing programs. The system segments customers into seven categories based on needs, attitudes, and behaviors, ranging from “passionate experts” to “value-minded family vacationers.” The company then e-mails video clips that would appeal to each segment to encourage more visits to its resorts.

All of the management systems we have just described are systems for business intelligence. **Business intelligence** is a contemporary term for data and software tools for organizing, analyzing, and providing access to data to help managers and other enterprise users make more informed decisions. You’ll learn more about business intelligence in Chapters 6 and 12.

Business intelligence applications are not limited to middle managers, and can be found at all levels of the organization, including systems for senior management. Senior managers need systems that address strategic issues and long-term trends, both in the firm and in the external environment. They are

FIGURE 2-5 VOYAGE-ESTIMATING DECISION-SUPPORT SYSTEM



This DSS operates on a powerful PC. It is used daily by managers who must develop bids on shipping contracts.

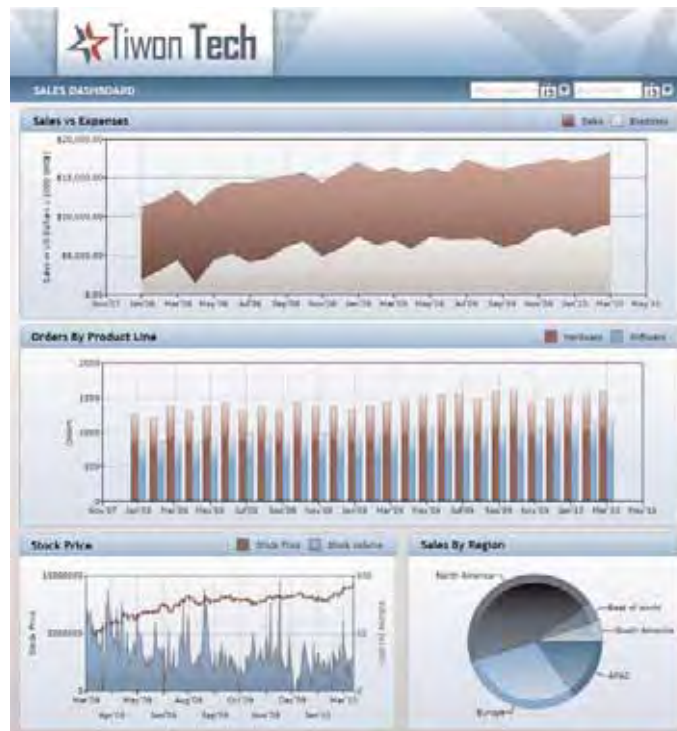
concerned with questions such as these: What will employment levels be in five years? What are the long-term industry cost trends, and where does our firm fit in? What products should we be making in five years? What new acquisitions would protect us from cyclical business swings?

Executive support systems (ESS) help senior management make these decisions. They address non-routine decisions requiring judgment, evaluation, and insight because there is no agreed-on procedure for arriving at a solution. ESS present graphs and data from many sources through an interface that is easy for senior managers to use. Often the information is delivered to senior executives through a **portal**, which uses a Web interface to present integrated personalized business content. You will learn more about other applications of portals in Chapter 11.

ESS are designed to incorporate data about external events, such as new tax laws or competitors, but they also draw summarized information from internal MIS and DSS. They filter, compress, and track critical data, displaying the data of greatest importance to senior managers. Increasingly, such systems include business intelligence analytics for analyzing trends, forecasting, and “drilling down” to data at greater levels of detail.

For example, the CEO of Leiner Health Products, one of the largest manufacturers of private-label vitamins and supplements in the United States, has an ESS that provides on his desktop a minute-to-minute view of the firm’s financial performance as measured by working capital, accounts receivable, accounts payable, cash flow, and inventory. The information is presented in the form of a **digital dashboard**, which displays on a single screen graphs and charts of key performance indicators for managing a company. Digital dashboards are becoming an increasingly popular tool for management decision makers.

Dundas Data Visualization’s digital dashboard delivers comprehensive and accurate information for decision making. The graphical overview of key performance indicators helps managers quickly spot areas that need attention.



The Interactive Session on Organizations describes real-world examples of several types of systems we have just described that are used by a successful fast-food chain. Note the types of systems illustrated in this case and the role they play in improving business performance and competitiveness.

SYSTEMS FOR LINKING THE ENTERPRISE

Reviewing all the different types of systems we have just described, you might wonder how a business can manage all the information in these different systems. You might also wonder how costly it is to maintain so many different systems. And you might wonder how all these different systems can share information and how managers and employees are able to coordinate their work. In fact, these are all important questions for businesses today.

Enterprise Applications

Getting all the different kinds of systems in a company to work together has proven a major challenge. Typically, corporations are put together both through normal “organic” growth and through acquisition of smaller firms. Over a period of time, corporations end up with a collection of systems, most of them older, and face the challenge of getting them all to “talk” with one another and work together as one corporate system. There are several solutions to this problem.

One solution is to implement **enterprise applications**, which are systems that span functional areas, focus on executing business processes across the business firm, and include all levels of management. Enterprise applications help businesses become more flexible and productive by coordinating their business processes more closely and integrating groups of processes so they focus on efficient management of resources and customer service.

There are four major enterprise applications: enterprise systems, supply chain management systems, customer relationship management systems, and knowledge management systems. Each of these enterprise applications integrates a related set of functions and business processes to enhance the performance of the organization as a whole. Figure 2-6 shows that the architecture for these enterprise applications encompasses processes spanning the entire organization and, in some cases, extending beyond the organization to customers, suppliers, and other key business partners.

Enterprise Systems Firms use **enterprise systems**, also known as enterprise resource planning (ERP) systems, to integrate business processes in manufacturing and production, finance and accounting, sales and marketing, and human resources into a single software system. Information that was previously fragmented in many different systems is stored in a single comprehensive data repository where it can be used by many different parts of the business.

For example, when a customer places an order, the order data flow automatically to other parts of the company that are affected by them. The order transaction triggers the warehouse to pick the ordered products and schedule shipment. The warehouse informs the factory to replenish whatever has been depleted. The accounting department is notified to send the customer an invoice. Customer service representatives track the progress of the order through every step to inform customers about the status of their orders. Managers are able to use firm-wide information to make more precise and timely decisions about daily operations and longer-term planning.

INTERACTIVE SESSION: ORGANIZATIONS

DOMINO'S SIZZLES WITH PIZZA TRACKER

When it comes to pizza, everyone has an opinion. Some of us think that our current pizza is just fine the way it is. Others have a favorite pizza joint that makes it like no one else. And many pizza lovers in America agreed up until recently that Domino's home-delivered pizza was among the worst. The home-delivery market for pizza chains in the United States is approximately \$15 billion per year. Domino's, which owns the largest home-delivery market share of any U.S. pizza chain, is finding ways to innovate by overhauling its in-store transaction processing systems and by providing other useful services to customers, such as its Pizza Tracker. And more important, Domino's is trying very hard to overcome its reputation for poor quality by radically improving ingredients and freshness. Critics believe the company significantly improved the quality of its pizza and customer service in 2010.

Domino's was founded in 1960 by Tom Monaghan and his brother James when they purchased a single pizza store in Ypsilanti, Michigan. The company slowly began to grow, and by 1978, Domino's had 200 stores. Today, the company is headquartered in Ann Arbor, Michigan, and operates almost 9,000 stores located in all 50 U.S. states and across the world in 60 international markets. In 2009, Domino's had \$1.5 billion in sales and earned \$80 million in profit.

Domino's is part of a heated battle among prominent pizza chains, including Pizza Hut, Papa John's, and Little Caesar. Pizza Hut is the only chain larger than Domino's in the U.S., but each of the four has significant market share. Domino's also competes with local pizza stores throughout the U.S. To gain a competitive advantage Domino's needs to deliver excellent customer service, and most importantly, good pizza. But it also benefits from highly effective information systems.

Domino's proprietary point-of-sale system, Pulse, is an important asset in maintaining consistent and efficient management functions in each of its restaurants. A point-of-sale system captures purchase and payment data at a physical location where goods or services are bought and sold using computers, automated cash registers, scanners, or other digital devices.

In 2003, Domino's implemented Pulse in a large portion of its stores, and those stores reported improved customer service, reduced mistakes, and

shorter training times. Since then, Pulse has become a staple of all Domino's franchises. Some of the functions Pulse performs at Domino's franchises are taking and customizing orders using a touch-screen interface, maintaining sales figures, and compiling customer information. Domino's prefers not to disclose the specific dollar amounts that it has saved from Pulse, but it's clear from industry analysts that the technology is working to cut costs and increase customer satisfaction.

More recently, Domino's released a new hardware and software platform called Pulse Evolution, which is now in use in a majority of Domino's more than 5,000 U.S. branches. Pulse Evolution improves on the older technology in several ways. First, the older software used a 'thick-client' model, which required all machines using the software to be fully equipped personal computers running Windows. Pulse Evolution, on the other hand, uses 'thin-client' architecture in which networked workstations with little independent processing power collect data and send them over the Internet to powerful Lenovo PCs for processing. These workstations lack hard drives, fans, and other moving parts, making them less expensive and easier to maintain. Also, Pulse Evolution is easier to update and more secure, since there's only one machine in the store which needs to be updated.

Along with Pulse Evolution, Domino's rolled out its state-of-the-art online ordering system, which includes Pizza Tracker. The system allows customers to watch a simulated photographic version of their pizza as they customize its size, sauces, and toppings. The image changes with each change a customer makes. Then, once customers place an order, they are able to view its progress online with Pizza Tracker. Pizza Tracker displays a horizontal bar that tracks an order's progress graphically. As a Domino's store completes each step of the order fulfillment process, a section of the bar becomes red. Even customers that place their orders via telephone can monitor their progress on the Web using Pizza Tracker at stores using Pulse Evolution. In 2010, Domino's introduced an online polling system to continuously upload information from local stores.

As with most instances of organizational change of this magnitude, Domino's experienced some resistance. Domino's originally wanted its franchises to

select Pulse to comply with its requirements for data security, but some franchises have resisted switching to Pulse and sought alternative systems. After Domino's tried to compel those franchises to use Pulse, the U.S. District Court for Minnesota sided with franchisees who claimed that Domino's could not force them to use this system. Now, Domino's continues to make improvements to Pulse in an effort to make it overwhelmingly appealing to all franchisees.

Pizza Hut and Papa John's also have online ordering capability, but lack the Pizza Tracker and the simulated pizza features that Domino's has successfully implemented. Today, online orders account for almost 20 percent of all of Domino's orders, which is up from less than 15 percent in 2008. But the battle

to sell pizza with technology rages on. Pizza Hut customers can now use their iPhones to place orders, and Papa John's customers can place orders by texting. With many billions of dollars at stake, all the large national pizza chains will be developing innovative new ways of ordering pizza and participating in its creation.

Sources: PRN Newswire, "Servant Systems Releases Domino's Store Polling Software," PRN Newswire, April 14, 2010; Julie Jargon, "Domino's IT Staff Delivers Slick Site, Ordering System," *The Wall Street Journal*, November 24, 2009; www.dominosbiz.com, accessed May 17, 2010; Paul McDougall, "Interop: Domino's Eyes Microsoft Cloud," *Information Week*, April 26, 2010; "Domino's Builds New Foundation Under Proprietary Store Tech," *Nation's Restaurant News*, February 25, 2009; "and "Inside Domino's 'Pizza Tracker' What It Does, Why, and How," *Nation's Restaurant News*, February 27, 2008.

CASE STUDY QUESTIONS

1. What kinds of systems are described in this case? Identify and describe the business processes each supports. Describe the inputs, processes, and outputs of these systems.
2. How do these systems help Domino's improve its business performance?
3. How did the online pizza ordering system improve the process of ordering a Domino's pizza?
4. How effective are these systems in giving Domino's a competitive edge? Explain your answer.

MIS IN ACTION

Visit Domino's Web site and examine the order placement and Pizza Tracker features. Then answer the following questions:

1. What steps does Pizza Tracker display for the user? How does the Pizza Tracker improve the customer experience?
2. Would the Pizza Tracker service influence you to order pizza from Domino's instead of a competing chain? Why or why not?
3. What improvements would you make to the order placement feature?

Supply Chain Management Systems Firms use **supply chain management (SCM) systems** to help manage relationships with their suppliers. These systems help suppliers, purchasing firms, distributors, and logistics companies share information about orders, production, inventory levels, and delivery of products and services so that they can source, produce, and deliver goods and services efficiently. The ultimate objective is to get the right amount of their products from their source to their point of consumption in the least amount of time and at the lowest cost. These systems increase firm profitability by lowering the costs of moving and making products and by enabling managers to make better decisions about how to organize and schedule sourcing, production, and distribution.

Supply chain management systems are one type of **interorganizational system** because they automate the flow of information across organizational boundaries. You will find examples of other types of interorganizational information systems throughout this text because such systems make it possible for firms to link electronically to customers and to outsource their work to other companies.

Customer Relationship Management Systems Firms use **customer relationship management (CRM) systems** to help manage their relationships with their customers. CRM systems provide information to coordinate all of the business processes that deal with customers in sales, marketing, and service to optimize revenue, customer satisfaction, and customer retention. This information helps firms identify, attract, and retain the most profitable customers; provide better service to existing customers; and increase sales.

FIGURE 2-6 ENTERPRISE APPLICATION ARCHITECTURE

Enterprise applications automate processes that span multiple business functions and organizational levels and may extend outside the organization.

Knowledge Management Systems Some firms perform better than others because they have better knowledge about how to create, produce, and deliver products and services. This firm knowledge is difficult to imitate, unique, and can be leveraged into long-term strategic benefits. **Knowledge management systems (KMS)** enable organizations to better manage processes for capturing and applying knowledge and expertise. These systems collect all relevant knowledge and experience in the firm, and make it available wherever and whenever it is needed to improve business processes and management decisions. They also link the firm to external sources of knowledge.

We examine enterprise systems and systems for supply chain management and customer relationship management in greater detail in Chapter 9. We discuss collaboration systems that support knowledge management in this chapter and cover other types of knowledge management applications in Chapter 11.

Intranets and Extranets

Enterprise applications create deep-seated changes in the way the firm conducts its business, offering many opportunities to integrate important business data into a single system. They are often costly and difficult to implement. Intranets and extranets deserve mention here as alternative tools for increasing integration and expediting the flow of information within the firm, and with customers and suppliers.

Intranets are simply internal company Web sites that are accessible only by employees. The term “intranet” refers to the fact that it is an internal network, in contrast to the Internet, which is a public network linking organizations and

other external networks. Intranets use the same technologies and techniques as the larger Internet, and they often are simply a private access area in a larger company Web site. Likewise with extranets. Extranets are company Web sites that are accessible to authorized vendors and suppliers, and often used to coordinate the movement of supplies to the firm's production apparatus.

For example, Six Flags, which operates 19 theme parks throughout North America, maintains an intranet for its 2,500 full-time employees that provides company-related news and information on each park's day-to-day operations, including weather forecasts, performance schedules, and details about groups and celebrities visiting the parks. The company also uses an extranet to broadcast information about schedule changes and park events to its 30,000 seasonal employees. We describe the technology for intranets and extranets in more detail in Chapter 7.

E-BUSINESS, E-COMMERCE, AND E-GOVERNMENT

The systems and technologies we have just described are transforming firms' relationships with customers, employees, suppliers, and logistic partners into digital relationships using networks and the Internet. So much business is now enabled by or based upon digital networks that we use the terms "electronic business" and "electronic commerce" frequently throughout this text.

Electronic business, or **e-business**, refers to the use of digital technology and the Internet to execute the major business processes in the enterprise. E-business includes activities for the internal management of the firm and for coordination with suppliers and other business partners. It also includes **electronic commerce**, or **e-commerce**.

E-commerce is the part of e-business that deals with the buying and selling of goods and services over the Internet. It also encompasses activities supporting those market transactions, such as advertising, marketing, customer support, security, delivery, and payment.

The technologies associated with e-business have also brought about similar changes in the public sector. Governments on all levels are using Internet technology to deliver information and services to citizens, employees, and businesses with which they work. **E-government** refers to the application of the Internet and networking technologies to digitally enable government and public sector agencies' relationships with citizens, businesses, and other arms of government.

In addition to improving delivery of government services, e-government makes government operations more efficient and also empowers citizens by giving them easier access to information and the ability to network electronically with other citizens. For example, citizens in some states can renew their driver's licenses or apply for unemployment benefits online, and the Internet has become a powerful tool for instantly mobilizing interest groups for political action and fund-raising.

2.3 SYSTEMS FOR COLLABORATION AND TEAMWORK

With all these systems and information, you might wonder how is it possible to make sense out of them? How do people working in firms pull it all together, work towards common goals, and coordinate plans and actions? Information systems can't make decisions, hire or fire people, sign contracts, agree on deals,

or adjust the price of goods to the marketplace. In addition to the types of systems we have just described, businesses need special systems to support collaboration and teamwork.

WHAT IS COLLABORATION?

Collaboration is working with others to achieve shared and explicit goals. Collaboration focuses on task or mission accomplishment and usually takes place in a business, or other organization, and between businesses. You collaborate with a colleague in Tokyo having expertise on a topic about which you know nothing. You collaborate with many colleagues in publishing a company blog. If you're in a law firm, you collaborate with accountants in an accounting firm in servicing the needs of a client with tax problems.

Collaboration can be short-lived, lasting a few minutes, or longer term, depending on the nature of the task and the relationship among participants. Collaboration can be one-to-one or many-to-many.

Employees may collaborate in informal groups that are not a formal part of the business firm's organizational structure or they may be organized into formal teams. Teams are part of the organization's business structure for getting things done. **Teams** have a specific mission that someone in the business assigned to them. They have a job to complete. The members of the team need to collaborate on the accomplishment of specific tasks and collectively achieve the team mission. The team mission might be to "win the game," or "increase online sales by 10%," or "prevent insulating foam from falling off a space shuttle." Teams are often short-lived, depending on the problems they tackle and the length of time needed to find a solution and accomplish the mission.

Collaboration and teamwork are more important today than ever for a variety of reasons.

- *Changing nature of work.* The nature of work has changed from factory manufacturing and pre-computer office work where each stage in the production process occurred independently of one another, and was coordinated by supervisors. Work was organized into silos. Within a silo, work passed from one machine tool station to another, from one desktop to another, until the finished product was completed. Today, the kinds of jobs we have require much closer coordination and interaction among the parties involved in producing the service or product. A recent report from the consulting firm McKinsey and Company argued that 41 percent of the U.S. labor force is now composed of jobs where interaction (talking, e-mailing, presenting, and persuading) is the primary value-adding activity. Even in factories, workers today often work in production groups, or pods.
- *Growth of professional work.* "Interaction" jobs tend to be professional jobs in the service sector that require close coordination, and collaboration. Professional jobs require substantial education, and the sharing of information and opinions to get work done. Each actor on the job brings specialized expertise to the problem, and all the actors need to take one another into account in order to accomplish the job.
- *Changing organization of the firm.* For most of the industrial age, managers organized work in a hierarchical fashion. Orders came down the hierarchy, and responses moved back up the hierarchy. Today, work is organized into groups and teams, who are expected to develop their own methods for accomplishing the task. Senior managers observe and measure results, but are much less likely to issue detailed orders or operating procedures. In part

this is because expertise has been pushed down in the organization, as have decision-making powers.

- *Changing scope of the firm.* The work of the firm has changed from a single location to multiple locations—offices or factories throughout a region, a nation, or even around the globe. For instance, Henry Ford developed the first mass-production automobile plant at a single Dearborn, Michigan factory. In 2010, Ford expected to produce about 3 million automobiles and employ over 200,000 employees at 90 plants and facilities worldwide. With this kind of global presence, the need for close coordination of design, production, marketing, distribution, and service obviously takes on new importance and scale. Large global companies need to have teams working on a global basis.
- *Emphasis on innovation.* Although we tend to attribute innovations in business and science to great individuals, these great individuals are most likely working with a team of brilliant colleagues, and all have been preceded by a long line of earlier innovators and innovations. Think of Bill Gates and Steve Jobs (founders of Microsoft and Apple), both of whom are highly regarded innovators, and both of whom built strong collaborative teams to nurture and support innovation in their firms. Their initial innovations derived from close collaboration with colleagues and partners. Innovation, in other words, is a group and social process, and most innovations derive from collaboration among individuals in a lab, a business, or government agencies. Strong collaborative practices and technologies are believed to increase the rate and quality of innovation.
- *Changing culture of work and business.* Most research on collaboration supports the notion that diverse teams produce better outputs, faster, than individuals working on their own. Popular notions of the crowd (“crowdsourcing,” and the “wisdom of crowds”) also provide cultural support for collaboration and teamwork.

BUSINESS BENEFITS OF COLLABORATION AND TEAMWORK

There are many articles and books that have been written about collaboration, some of them by business executives and consultants, and a great many by academic researchers in a variety of businesses. Nearly all of this research is anecdotal. Nevertheless, among both business and academic communities there is a general belief that the more a business firm is “collaborative,” the more successful it will be, and that collaboration within and among firms is more essential than in the past.

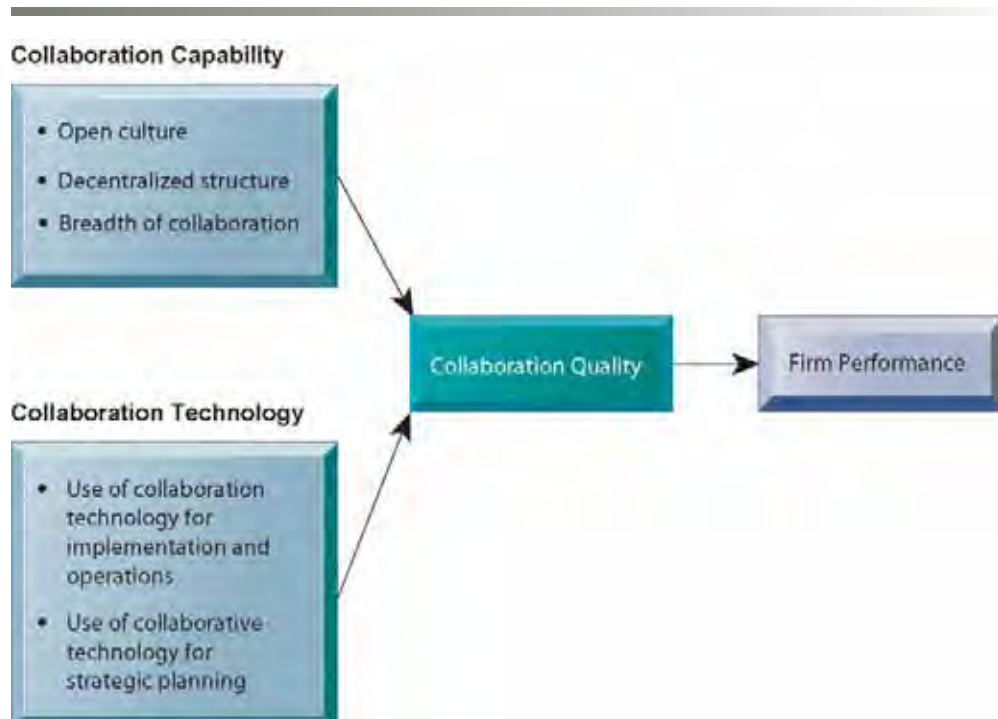
A recent global survey of business and information systems managers found that investments in collaboration technology produced organizational improvements that returned over four times the amount of the investment, with the greatest benefits for sales, marketing, and research and development functions (Frost and White, 2009). Another study of the value of collaboration also found that the overall economic benefit of collaboration was significant: for every word seen by an employee in e-mails from others, \$70 of additional revenue was generated (Aral, Brynjolfsson, and Van Alstyne, 2007).

Table 2-2 summarizes some of the benefits of collaboration identified by previous writers and scholars. Figure 2-7 graphically illustrates how collaboration is believed to impact business performance.

While there are many presumed benefits to collaboration, you really need a supportive business firm culture and the right business processes before you can achieve meaningful collaboration. You also need a healthy investment in collaborative technologies. We now examine these requirements.

TABLE 2-2 BUSINESS BENEFITS OF COLLABORATION

BENEFIT	RATIONALE
Productivity	People working together can complete a complex task faster than the same number of people working in isolation from one another. There will be fewer errors.
Quality	People working collaboratively can communicate errors, and correct actions faster, when they work together than if they work in isolation. Can lead to a reduction in buffers and time delay among production units.
Innovation	People working collaboratively in groups can come up with more innovative ideas for products, services, and administration than the same number working in isolation from one another.
Customer service	People working together in teams can solve customer complaints and issues faster and more effectively than if they were working in isolation from one another.
Financial performance (profitability, sales, and sales growth)	As a result of all of the above, collaborative firms have superior sales growth and financial performance.

FIGURE 2-7 REQUIREMENTS FOR COLLABORATION

Successful collaboration requires an appropriate organizational structure and culture, along with appropriate collaboration technology.

BUILDING A COLLABORATIVE CULTURE AND BUSINESS PROCESSES

Collaboration won't take place spontaneously in a business firm, especially if there is no supportive culture or business processes. Business firms, especially large firms, had in the past a reputation for being "command and control"

organizations where the top leaders thought up all the really important matters, and then ordered lower-level employees to execute senior management plans. The job of middle management supposedly was to pass messages back and forth, up and down the hierarchy.

Command and control firms required lower-level employees to carry out orders without asking too many questions, with no responsibility to improve processes, and with no rewards for teamwork or team performance. If your workgroup needed help from another work group, that was something for the bosses to figure out. You never communicated horizontally, always vertically, so management could control the process. As long as employees showed up for work, and performed the job satisfactorily, that's all that was required. Together, the expectations of management and employees formed a culture, a set of assumptions about common goals and how people should behave. Many business firms still operate this way.

A collaborative business culture and business processes are very different. Senior managers are responsible for achieving results but rely on teams of employees to achieve and implement the results. Policies, products, designs, processes, and systems are much more dependent on teams at all levels of the organization to devise, to create, and to build products and services. Teams are rewarded for their performance, and individuals are rewarded for their performance in a team. The function of middle managers is to build the teams, coordinate their work, and monitor their performance. In a collaborative culture, senior management establishes collaboration and teamwork as vital to the organization, and it actually implements collaboration for the senior ranks of the business as well.

TOOLS AND TECHNOLOGIES FOR COLLABORATION AND TEAMWORK

A collaborative, team-oriented culture won't produce benefits if there are no information systems in place to enable collaboration. Currently there are hundreds of tools designed to deal with the fact that, in order to succeed in our jobs, we are all dependent on one another, our fellow employees, customers, suppliers, and managers. Table 2-3 lists the most important types of collaboration software tools. Some high-end tools like IBM Lotus Notes are expensive, but powerful enough for global firms. Others are available online for free (or with premium versions for a modest fee) and are suitable for small businesses. Let's look more closely at some of these tools.

TABLE 2-3 FIFTEEN CATEGORIES OF COLLABORATIVE SOFTWARE TOOLS

E-mail and instant messaging	White boarding
Collaborative writing	Web presenting
Collaborative reviewing/editing	Work scheduling
Event scheduling	Document sharing (including wikis)
File sharing	Mind mapping
Screen sharing	Large audience Webinars
Audio conferencing	Co-browsing
Video conferencing	

Source: mindmeister.com, 2009.

E-mail and Instant Messaging (IM)

E-mail and instant messaging have been embraced by corporations as a major communication and collaboration tool supporting interaction jobs. Their software operates on computers, cell phones, and other wireless handheld devices and includes features for sharing files as well as transmitting messages. Many instant messaging systems allow users to engage in real-time conversations with multiple participants simultaneously. Gartner technology consultants predict that within a few years, instant messaging will be the “de facto tool” for voice, video, and text chat for 95 percent of employees in big companies.

Social Networking

We’ve all visited social networking sites such as MySpace and Facebook, which feature tools to help people share their interests and interact. Social networking tools are quickly becoming a corporate tool for sharing ideas and collaborating among interaction-based jobs in the firm. Social networking sites such as LinkedIn.com provide networking services to business professionals, while other niche sites have sprung up to serve lawyers, doctors, engineers, and even dentists. IBM built a Community Tools component into its Lotus Notes collaboration software to add social networking features. Users are able to submit questions to others in the company and receive answers via instant messaging.

Wikis

Wikis are a type of Web site that makes it easy for users to contribute and edit text content and graphics without any knowledge of Web page development or programming techniques. The most well-known wiki is Wikipedia, the largest collaboratively edited reference project in the world. It relies on volunteers, makes no money, and accepts no advertising. Wikis are ideal tools for storing and sharing company knowledge and insights. Enterprise software vendor SAP AG has a wiki that acts as a base of information for people outside the company, such as customers and software developers who build programs that interact with SAP software. In the past, those people asked and sometimes answered questions in an informal way on SAP online forums, but that was an inefficient system, with people asking and answering the same questions over and over.

At Intel Corporation, employees built their own internal wiki, and it has been edited over 100,000 times and viewed more than 27 million times by Intel employees. The most common search is for the meaning of Intel acronyms such as EASE for “employee access support environment” and POR for “plan of record.” Other popular resources include a page about software engineering processes at the company. Wikis are destined to become the major repository for unstructured corporate knowledge in the next five years in part because they are so much less costly than formal knowledge management systems and they can be much more dynamic and current.

Virtual Worlds

Virtual worlds, such as Second Life, are online 3-D environments populated by “residents” who have built graphical representations of themselves known as avatars. Organizations such as IBM and INSEAD, an international business school with campuses in France and Singapore, are using this virtual world to house online meetings, training sessions, and “lounges.” Real-world people represented by avatars meet, interact, and exchange ideas at these virtual locations. Communication takes place in the form of text messages similar to instant messages.

Internet-Based Collaboration Environments

There are now suites of software products providing multi-function platforms for workgroup collaboration among teams of employees who work together from many different locations. Numerous collaboration tools are available, but the most widely used are Internet-based audio conferencing and video conferencing systems, online software services such as Google Apps/Google Sites, and corporate collaboration systems such as Lotus Notes and Microsoft SharePoint.

Virtual Meeting Systems For many businesses, including investment banking, accounting, law, technology services, and management consulting, extensive travel is a fact of life. The expenses incurred by business travel have been steadily rising in recent years, primarily due to increasing energy costs. In an effort to reduce travel expenses, many companies, both large and small, are adopting videoconferencing and Web conferencing technologies.

Companies such as Heinz, General Electric, Pepsico, and Wachovia are using virtual meeting systems for product briefings, training courses, strategy sessions, and even inspirational chats.

An important feature of leading-edge high-end videoconferencing systems is **telepresence** technology, an integrated audio and visual environment that allows a person to give the appearance of being present at a location other than his or her true physical location. The Interactive Session on Management describes telepresence and other technologies for hosting these “virtual” meetings. You can also find video cases on this topic.

Google Apps/Google Sites One of the most widely used “free” online services for collaboration is Google Apps/Google Sites. Google Sites allows users to quickly create online, group-editable Web sites. Google Sites is one part of the larger Google Apps suite of tools. Google Sites users can design and populate Web sites in minutes and, without any advanced technical skills, post a variety of files including calendars, text, spreadsheets, and videos for private, group, or public viewing and editing.

Google Apps works with Google Sites and includes the typical desktop productivity office software tools (word processing, spreadsheets, presentation, contact management, messaging, and mail). A Premier edition charging businesses \$50 per year for each user offers 25 gigabytes of mail storage, a 99.9-percent uptime guarantee for e-mail, tools to integrate with the firm’s existing infrastructure, and 24/7 phone support. Table 2-4 describes some of the capabilities of Google Apps/Google Sites.

TABLE 2-4 GOOGLE APPS/GOOGLE SITES COLLABORATION FEATURES

GOOGLE APPS/GOOGLE SITES CAPABILITY	DESCRIPTION
Google Calendar	Private and shared calendars; multiple calendars
Google Gmail	Google’s free online e-mail service, with mobile access capabilities
Google Talk	Instant messaging, text and voice chat
Google Docs	Online word processing, presentation, spreadsheet, and drawing software; online editing and sharing
Google Sites	Team collaboration sites for sharing documents, schedules, calendars; searching documents and creating group wikis
Google Video	Private hosted video sharing
Google Groups	User-created groups with mailing lists, shared calendars, documents, sites, and video; searchable archives

INTERACTIVE SESSION: MANAGEMENT

VIRTUAL MEETINGS: SMART MANAGEMENT

Instead of taking that 6:30 A.M. plane to make a round of meetings in Dallas, wouldn't it be great if you could attend these events without leaving your desktop? Today you can, thanks to technologies for videoconferencing and for hosting online meetings over the Web. A June 2008 report issued by the Global e-Sustainability Initiative and the Climate Group estimated that up to 20 percent of business travel could be replaced by virtual meeting technology.

A videoconference allows individuals at two or more locations to communicate simultaneously through two-way video and audio transmissions. The critical feature of videoconferencing is the digital compression of audio and video streams by a device called a codec. Those streams are then divided into packets and transmitted over a network or the Internet. Until recently, the technology was plagued by poor audio and video performance, and its cost was prohibitively high for all but the largest and most powerful corporations. Most companies deemed videoconferencing a poor substitute for face-to-face meetings.

However, vast improvements in videoconferencing and associated technologies have renewed interest in this way of working. Videoconferencing is now growing at an annual rate of 30 percent. Proponents of the technology claim that it does more than simply reduce costs. It allows for "better" meetings as well: it's easier to meet with partners, suppliers, subsidiaries, and colleagues from within the office or around the world on a more frequent basis, which in most cases simply cannot be reasonably accomplished through travel. You can also meet with contacts that you wouldn't be able to meet at all without videoconferencing technology.

For example, Rip Curl, a Costa Mesa, California, producer of surfing equipment, uses videoconferencing to help its designers, marketers, and manufacturers collaborate on new products. Executive recruiting firm Korn/Ferry International uses video interviews to screen potential candidates before presenting them to clients.

Today's state-of-the-art videoconferencing systems display sharp high-definition TV images. The top-of-the-line videoconferencing technology is known as telepresence. Telepresence strives to make users feel as if they are actually present in a location different

from their own. You can sit across a table from a large screen showing someone who looks quite real and life-size, but may be in Brussels or Hong Kong. Only the handshake and exchange of business cards are missing. Telepresence products provide the highest-quality videoconferencing available on the market to date. Cisco Systems has installed telepresence systems in more than 500 organizations around the world. Prices for fully equipped telepresence rooms can run to \$500,000.

Companies able to afford this technology report large savings. For example, technology consulting firm Accenture reports that it eliminated expenditures for 240 international trips and 120 domestic flights in a single month. The ability to reach customers and partners is also dramatically increased. Other business travelers report tenfold increases in the number of customers and partners they are able to reach for a fraction of the previous price per person. MetLife, which installed Cisco Telepresence in three dedicated conference rooms in Chicago, New York, and New Jersey, claims that the technology not only saved time and expense but also helped the company meet its "green" environmental goals of reducing carbon emissions by 20 percent in 2010.

Videoconferencing products have not traditionally been feasible for small businesses, but another company, LifeSize, has introduced an affordable line of products as low as \$5,000. Overall, the product is easy to use and will allow many smaller companies to use a high-quality videoconferencing product.

There are even some free Internet-based options like Skype videoconferencing and ooVoo. These products are of lower quality than traditional videoconferencing products, and they are proprietary, meaning they can only talk to others using that very same system. Most videoconferencing and telepresence products are able to interact with a variety of other devices. Higher-end systems include features like multi-party conferencing, video mail with unlimited storage, no long-distance fees, and a detailed call history.

Companies of all sizes are finding Web-based online meeting tools such as WebEx, Microsoft Office Live Meeting, and Adobe Acrobat Connect especially helpful for training and sales presentations. These products enable participants to share

documents and presentations in conjunction with audioconferencing and live video via Webcam. Cornerstone Information Systems, a Bloomington, Indiana, business software company with 60 employees, cut its travel costs by 60 percent and the average time to close a new sale by 30 percent by performing many product demonstrations online.

Before setting up videoconferencing or telepresence, it's important for a company to make sure it really needs the technology to ensure that it will be a profitable venture. Companies should determine how their employees conduct meetings, how they communicate and with what technologies, how much travel they do, and their network's capabilities. There are still plenty of times when face-to-face interaction is more desirable, and often traveling to meet a client is essential for cultivating clients and closing sales.

Videoconferencing figures to have an impact on the business world in other ways, as well. More employees may be able to work closer to home and balance their work and personal lives more efficiently; traditional office environments and corporate headquarters may shrink or disappear; and freelancers, contractors, and workers from other countries will become a larger portion of the global economy.

Sources: Joe Sharkey, "Setbacks in the Air Add to Lure of Virtual Meetings," *The New York Times*, April 26, 2010; Bob Evans, "Pepsi Picks Cisco for Huge TelePresence Deal," February 2, 2010; Esther Schein, "Telepresence Catching On, But Hold On to Your Wallet," *Computerworld*, January 22, 2010; Christopher Musico, "Web Conferencing: Calling Your Conference to Order," *Customer Relationship Management*, February 2009; and Brian Nadel, "3 Videoconferencing Services Pick Up Where Your Travel Budget Leaves Off," *Computerworld*, January 6, 2009; Johna Till Johnson, "Videoconferencing Hits the Big Times.... For Real," *Computerworld*, May 28, 2009.

CASE STUDY QUESTIONS

1. One consulting firm has predicted that video and Web conferencing will make business travel extinct. Do you agree? Why or why not?
2. What is the distinction between videoconferencing and telepresence?
3. What are the ways in which videoconferencing provides value to a business? Would you consider it smart management? Explain your answer.
4. If you were in charge of a small business, would you choose to implement videoconferencing? What factors would you consider in your decision?

MIS IN ACTION

Explore the WebEx Web site (www.webex.com) and answer the following questions:

1. List and describe its capabilities for small-medium and large businesses. How useful is WebEx? How can it help companies save time and money?
2. Compare WebEx video capabilities with the videoconferencing capabilities described in this case.
3. Describe the steps you would take to prepare for a Web conference as opposed to a face-to-face conference.

Google has developed an additional Web-based platform for real-time collaboration and communication called Google Wave. "Waves" are "equal parts conversation and document," in which any participant of a wave can reply anywhere in the message, edit the content, and add or remove participants at any point in the process. Users are able to see responses from other participants on their "wave" while typing occurs, accelerating the pace of discussion.

For example, Clear Channel Radio in Greensboro, North Carolina, used Google Wave for an on air and online promotion that required input from sales people, the sales manager, the station program director, the station promotions director, the online content coordinator, and the Web manager. Without Google Wave, these people would have used numerous back and forth e-mails, sent graphics files to each other for approval, and spent large amounts of time tracking people down by phone. Wave helped them complete the entire project in just a fraction of time it would normally have taken (Boulton, 2010).

Microsoft SharePoint Microsoft SharePoint is the most widely adopted collaboration system for small and medium-sized firms that use Microsoft server and networking products. Some larger firms have adopted it as well. SharePoint is a browser-based collaboration and document management platform, combined with a powerful search engine that is installed on corporate servers.

SharePoint has a Web-based interface and close integration with everyday tools such as Microsoft Office desktop software products. Microsoft's strategy is to take advantage of its "ownership" of the desktop through its Microsoft Office and Windows products. For Microsoft, the path towards enterprise-wide collaboration starts with the Office desktop and Microsoft network servers. SharePoint software makes it possible for employees to share their Office documents and collaborate on projects using Office documents as the foundation.

SharePoint products and technologies provide a platform for Web-based collaboration at the enterprise level. SharePoint can be used to host Web sites that organize and store information in one central location to enable teams to coordinate work activities, collaborate on and publish documents, maintain task lists, implement workflows, and share information via wikis, blogs, and Twitter-style status updates. Because SharePoint stores and organizes information in one place, users can find relevant information quickly and efficiently while working together closely on tasks, projects, and documents.

Here is a list of SharePoint's major capabilities:

- Provides a single workspace for teams to coordinate schedules, organize documents, and participate in discussions, within the organization or over an extranet.
- Facilitates creation and management of documents with the ability to control versions, view past revisions, enforce document-specific security, and maintain document libraries.
- Provides announcements, alerts, and discussion boards to inform users when actions are required or changes are made to existing documentation or information.
- Supports personalized content and both personal and public views of documents and applications.
- Provides templates for blogs and wikis to help teams share information and brainstorm.
- Provides tools to manage document libraries, lists, calendars, tasks, and discussion boards offline, and to synchronize changes when reconnected to the network.
- Provides enterprise search tools for locating people, expertise, and content.

Sony Electronics, a leading provider of consumer and professional electronics products with more 170,000 employees around the world, uses Microsoft Office SharePoint Server 2010 to improve information access, enhance collaboration, and make better use of experts inside the company. Sony uses SharePoint's wiki tools to capture and organize employees' insights and comments into a company-wide body of knowledge, and its people search feature to identify employees with expertise about specific projects and research areas. The company also used SharePoint to create a central file-sharing repository. This helps employees collaboratively write, edit, and exchange documents and eliminates the need to e-mail documents back and forth. All of these improvements have cut development time on key projects from three to six months to three to six weeks. (Microsoft, 2010).

Lotus Notes For very large firms (Fortune 1000 and Russell 2000 firms), the most widely used collaboration tool is IBM's Lotus Notes. Lotus Notes was an early example of groupware, a collaborative software system with capabilities for sharing calendars, collective writing and editing, shared database access, and electronic meetings, with each participant able to see and display information from others and other activities. Notes is now Web-enabled with enhancements for social networking (Lotus Connections) and a scripting and application development environment so that users can build custom applications to suit their unique needs.

IBM Software Group defines Lotus Notes as an “integrated desktop client option for accessing business e-mail, calendars, and applications on an IBM Lotus Domino server.” The Notes software installed on the user's client computer allows the machine to be used as a platform for e-mail, instant messaging (working with Lotus Sametime), Web browsing, and calendar/resource reservation work, as well as for interacting with collaborative applications. Today, Notes also provides blogs, wikis, RSS aggregators, CRM, and help desk systems.

Thousands of employees at hundreds of large firms such as Toshiba, Air France, and Global Hyatt Corporation use IBM Lotus Notes as their primary collaboration and teamwork tools. Firmwide installations of Lotus Notes at a large Fortune 1000 firm may cost millions of dollars a year and require extensive support from the corporate information systems department. Although online tools like the Google collaboration services described earlier do not require installation on corporate servers or much support from the corporate IS staff, they are not as powerful as those found in Lotus Notes. It is unclear whether they could scale to the size of a global firm (at least for now). Very large firms adopt IBM Lotus Notes because Notes promises higher levels of security and reliability, and the ability to retain control over sensitive corporate information.

For example, EuroChem, the largest agrochemical company in Russia and one of Europe's top three fertilizer producers, used Lotus Notes to create a single standard platform for collaboration and document management. The software facilitates cooperation and collaboration among geographically dispersed regional production centers and provides a secure automated platform for document exchange. With Lotus Notes, EuroChem is able to register and control all documents, to establish routing paths for document approval, and to maintain a full history of all movements and changes. Security features allow the company to create a personalized work environment for each user and to prevent unauthorized users from accessing sensitive information (IBM, 2009).

Large firms in general do not feel secure using popular online software services for “strategic” applications because of the implicit security concerns. However, most experts believe that these concerns will diminish as experience with online tools grows, and the sophistication of online software service suppliers increases to protect security and reduce vulnerability. Table 2-5 describes additional online collaboration tools.

Checklist for Managers: Evaluating and Selecting Collaboration Software Tools

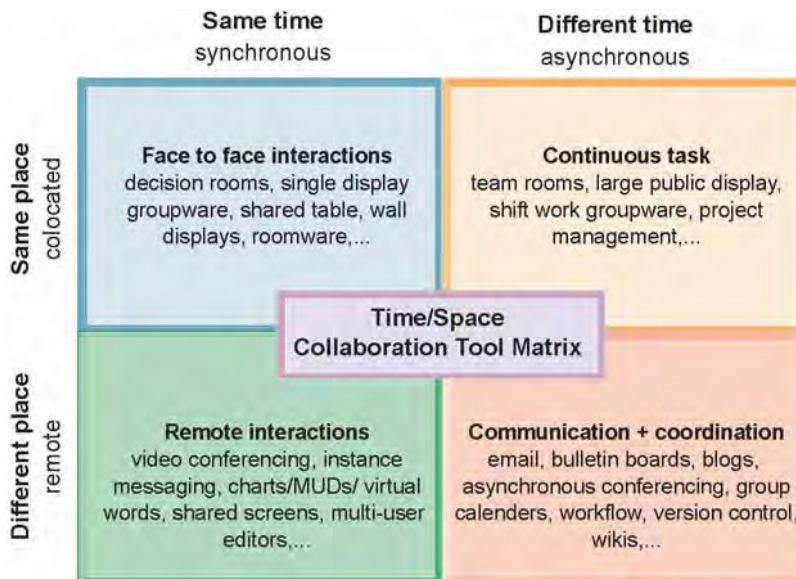
With so many collaboration tools and services available, how do you choose the right collaboration technology for your firm? To answer this question, you need a framework for understanding just what problems these tools are designed to solve. One framework that has been helpful for us to talk about collaboration tools is the time/space collaboration matrix developed in the early 1990s by a number of collaborative work scholars (Figure 2-8).

TABLE 2-5 OTHER POPULAR ONLINE COLLABORATION TOOLS

TOOL	DESCRIPTION
Socialtext	An enterprise server-based collaboration environment which provides social networking, Twitter-like micro-blogging, wiki workspaces, with integrated weblogs, distributed spreadsheets, and a personal home page for every user. Delivered in a variety of hosted cloud services, as well as on-site appliances to provide enterprise customers with flexible deployment options that meet their security requirements.
Zoho	Collecting and collaborating on text, line drawings, images, Web pages, video, RSS feeds. Project management (includes task management, work flow, reports, time tracking, forums, and file sharing). Free or monthly charge for premium service.
BlueTie	Online collaboration with e-mail, scheduling, to-do lists, contact management, file sharing. \$4.99 per user per month.
Basecamp	Sharing to-do lists, files, message boards, milestone tracking. Free for a single project, \$24/month for 15 projects with 5 gigabytes of storage.
Onehub	Sharing documents, calendars, Web bookmarks; e-mail integration and IM. Manage hub resources; bulletin board.
WorkZone	Collaboration with file sharing; project management; customization; security.

Socialtext's enterprise social networking products—including microblogging, blogs, wikis, profiles and social spreadsheets—enable employees to share vital information and work together in real-time. Built on a flexible, Web-oriented architecture, Socialtext integrates with virtually any traditional system of record, such as CRM and ERP, enabling companies to discuss, collaborate, and take action on key business processes.



FIGURE 2-8 THE TIME/SPACE COLLABORATION TOOL MATRIX

Collaboration technologies can be classified in terms of whether they support interactions at the same or different time or place, and whether these interactions are remote or co-located.

The time/space matrix focuses on two dimensions of the collaboration problem: time and space. For instance, you need to collaborate with people in different time zones and you cannot all meet at the same time. Midnight in New York is noon in Bombay, so this makes it difficult to have a video-conference (the people in New York are too tired). Time is clearly an obstacle to collaboration on a global scale.

Place (location) also inhibits collaboration in large global or even national and regional firms. Assembling people for a physical meeting is made difficult by the physical dispersion of distributed firms (firms with more than one location), the cost of travel, and the time limitations of managers.

The collaboration technologies we have just described are ways of overcoming the limitations of time and space. Using this time/space framework will help you to choose the most appropriate collaboration and teamwork tools for your firm. Note that some tools are applicable in more than one time/place scenario. For example, Internet collaboration suites such as Lotus Notes have capabilities for both synchronous (instant messaging, electronic meeting tools) and asynchronous (e-mail, wikis, document editing) interactions.

Here's a "to-do" list to get started. If you follow these six steps, you should be led to investing in the correct collaboration software for your firm at a price you can afford, and within your risk tolerance.

1. What are the collaboration challenges facing the firm in terms of time and space? Locate your firm in the time/space matrix. Your firm can occupy more than one cell in the matrix. Different collaboration tools will be needed for each situation.
2. Within each cell of the matrix where your firm faces challenges, exactly what kinds of solutions are available? Make a list of vendor products.
3. Analyze each of the products in terms of their cost and benefits to your firm. Be sure to include the costs of training in your cost estimates, and the costs of involving the information systems department if needed.

4. Identify the risks to security and vulnerability involved with each of the products. Is your firm willing to put proprietary information into the hands of external service providers over the Internet? Is your firm willing to risk its important operations to systems controlled by other firms? What are the financial risks facing your vendors? Will they be here in three to five years? What would be the cost of making a switch to another vendor in the event the vendor firm fails?
5. Seek the help of potential users to identify implementation and training issues. Some of these tools are easier to use than others.
6. Make your selection of candidate tools, and invite the vendors to make presentations.

2.4 THE INFORMATION SYSTEMS FUNCTION IN BUSINESS

We've seen that businesses need information systems to operate today and that they use many different kinds of systems. But who is responsible for running these systems? Who is responsible for making sure the hardware, software, and other technologies used by these systems are running properly and are up to date? End users manage their systems from a business standpoint, but managing the technology requires a special information systems function.

In all but the smallest of firms, the **information systems department** is the formal organizational unit responsible for information technology services. The information systems department is responsible for maintaining the hardware, software, data storage, and networks that comprise the firm's IT infrastructure. We describe IT infrastructure in detail in Chapter 5.

THE INFORMATION SYSTEMS DEPARTMENT

The information systems department consists of specialists, such as programmers, systems analysts, project leaders, and information systems managers. **Programmers** are highly trained technical specialists who write the software instructions for computers. **Systems analysts** constitute the principal liaisons between the information systems groups and the rest of the organization. It is the systems analyst's job to translate business problems and requirements into information requirements and systems. **Information systems managers** are leaders of teams of programmers and analysts, project managers, physical facility managers, telecommunications managers, or database specialists. They are also managers of computer operations and data entry staff. Also, external specialists, such as hardware vendors and manufacturers, software firms, and consultants, frequently participate in the day-to-day operations and long-term planning of information systems.

In many companies, the **information systems department** is headed by a **chief information officer (CIO)**. The CIO is a senior manager who oversees the use of information technology in the firm. Today's CIOs are expected to have a strong business background as well as information systems expertise and to play a leadership role in integrating technology into the firm's business strategy. Large firms today also have positions for a chief security officer, chief knowledge officer, and chief privacy officer, all of whom work closely with the CIO.

The **chief security officer (CSO)** is in charge of information systems security for the firm and is responsible for enforcing the firm's information security

policy (see Chapter 8). (Sometimes this position is called the chief information security officer [CISO] where information systems security is separated from physical security.) The CSO is responsible for educating and training users and information systems specialists about security, keeping management aware of security threats and breakdowns, and maintaining the tools and policies chosen to implement security.

Information systems security and the need to safeguard personal data have become so important that corporations collecting vast quantities of personal data have established positions for a **chief privacy officer (CPO)**. The CPO is responsible for ensuring that the company complies with existing data privacy laws.

The **chief knowledge officer (CKO)** is responsible for the firm's knowledge management program. The CKO helps design programs and systems to find new sources of knowledge or to make better use of existing knowledge in organizational and management processes.

End users are representatives of departments outside of the information systems group for whom applications are developed. These users are playing an increasingly large role in the design and development of information systems.

In the early years of computing, the information systems group was composed mostly of programmers who performed highly specialized but limited technical functions. Today, a growing proportion of staff members are systems analysts and network specialists, with the information systems department acting as a powerful change agent in the organization. The information systems department suggests new business strategies and new information-based products and services, and coordinates both the development of the technology and the planned changes in the organization.

ORGANIZING THE INFORMATION SYSTEMS FUNCTION

There are many types of business firms, and there are many ways in which the IT function is organized within the firm. A very small company will not have a formal information systems group. It might have one employee who is responsible for keeping its networks and applications running, or it might use consultants for these services. Larger companies will have a separate information systems department, which may be organized along several different lines, depending on the nature and interests of the firm. Our Learning Track describes alternative ways of organizing the information systems function within the business.

The question of how the information systems department should be organized is part of the larger issue of IT governance. **IT governance** includes the strategy and policies for using information technology within an organization. It specifies the decision rights and framework for accountability to ensure that the use of information technology supports the organization's strategies and objectives. How much should the information systems function be centralized? What decisions must be made to ensure effective management and use of information technology, including the return on IT investments? Who should make these decisions? How will these decisions be made and monitored? Firms with superior IT governance will have clearly thought out the answers (Weill and Ross, 2004).

2.5 HANDS-ON MIS PROJECTS

The projects in this section give you hands-on experience analyzing opportunities to improve business processes with new information system applications, using a spreadsheet to improve decision making about suppliers, and using Internet software to plan efficient transportation routes.

Management Decision Problems

1. Don's Lumber Company on the Hudson River is one of the oldest retail lumberyards in New York State. It features a large selection of materials for flooring, decks, moldings, windows, siding, and roofing. The prices of lumber and other building materials are constantly changing. When a customer inquires about the price on pre-finished wood flooring, sales representatives consult a manual price sheet and then call the supplier for the most recent price. The supplier in turn uses a manual price sheet, which has been updated each day. Often the supplier must call back Don's sales reps because the company does not have the newest pricing information immediately on hand. Assess the business impact of this situation, describe how this process could be improved with information technology, and identify the decisions that would have to be made to implement a solution. Who would make those decisions?
2. Henry's Hardware is a small family business in Sacramento, California. The owners must use every square foot of store space as profitably as possible. They have never kept detailed inventory or sales records. As soon as a shipment of goods arrives, the items are immediately placed on store shelves. Invoices from suppliers are only kept for tax purposes. When an item is sold, the item number and price are rung up at the cash register. The owners use their own judgment in identifying items that need to be reordered. What is the business impact of this situation? How could information systems help the owners run their business? What data should these systems capture? What decisions could the systems improve?

Improving Decision Making: Using a Spreadsheet to Select Suppliers

Software skills: Spreadsheet date functions, data filtering, DAVERAGE function
Business skills: Analyzing supplier performance and pricing

In this exercise, you will learn how to use spreadsheet software to improve management decisions about selecting suppliers. You will start with raw transactional data about suppliers organized as a large spreadsheet list. You will use the spreadsheet software to filter the data based on several different criteria to select the best suppliers for your company.

You run a company that manufactures aircraft components. You have many competitors who are trying to offer lower prices and better service to customers, and you are trying to determine whether you can benefit from better supply chain management. In myMISlab, you will find a spreadsheet file that contains a list of all of the items that your firm has ordered from its suppliers during the past three months. A sample is shown below, but the Web site may have a more recent version of this spreadsheet for this exercise. The fields in the spreadsheet file include vendor name, vendor identification number, purchaser's order number, item identification number and item description (for each item ordered from the vendor), cost per item, number of units of the item ordered (quantity), total cost of each

Vendor Name	Vendor No.	Order No.	Item No.	Item Description	Item Cost	Quantity	Cost per order	A/P Terms	Order Date	Arrival Date
Spacetime Technology	2	A0111	6489	O-Ring	\$ 3.00	600	\$ 2,700.00	35	10/10/10	10/10/10
Steelpin Inc.	6	A0115	5310	Shielded Cablefit	\$ 1.10	17,500	\$ 19,250.00	30	09/20/10	09/31/10
Steelpin Inc.	6	A0123	4312	Bolt-nut package	\$ 3.75	4,250	\$ 15,937.50	30	09/25/10	09/01/10
Steelpin Inc.	6	A0204	5310	Shielded Cablefit	\$ 1.10	16,500	\$ 18,150.00	30	09/15/10	10/05/10
Steelpin Inc.	6	A0205	5677	Side Panel	\$ 195.00	120	\$ 23,400.00	30	11/02/10	11/13/10
Steelpin Inc.	6	A0207	4312	Bolt-nut package	\$ 3.75	4,200	\$ 15,750.00	30	09/01/10	09/10/10
Alum Sheeting	5	A0223	4224	Bolt-nut package	\$ 3.95	4,500	\$ 17,775.00	30	10/15/10	10/20/10
Alum Sheeting	5	A0423	5417	Control Panel	\$ 255.00	500	\$ 127,500.00	30	10/20/10	10/27/10
Alum Sheeting	5	A0443	1243	Airframe fasteners	\$ 4.25	10,000	\$ 42,500.00	30	09/08/10	09/14/10
Alum Sheeting	5	A0446	5417	Control Panel	\$ 255.00	408	\$ 103,530.00	30	09/01/10	09/10/10
Spacetime Technology	2	A0533	8752	Gasket	\$ 4.05	1,500	\$ 6,075.00	25	08/20/10	08/25/10
Spacetime Technology	2	A0555	6489	O-Ring	\$ 3.00	1,100	\$ 3,300.00	25	10/05/10	10/10/10
Spacetime Technology	2	A0622	8752	Gasket	\$ 4.05	1,550	\$ 6,277.50	25	09/25/10	10/05/10
Spacetime Technology	2	A0666	5125	Shielded Cablefit	\$ 1.15	15,000	\$ 17,250.00	25	10/01/10	10/15/10
Spacetime Technology	2	A0777	6489	O-Ring	\$ 3.00	1,050	\$ 3,150.00	25	10/08/10	11/10/10
Spacetime Technology	2	A1322	4111	Bolt-nut package	\$ 3.65	4,200	\$ 14,910.00	25	09/15/10	10/15/10
Durable Products	3	A1334	0300	Gasket	\$ 3.65	1,250	\$ 4,562.50	45	10/01/10	10/05/10
Durable Products	3	A1335	0300	Gasket	\$ 3.65	1,400	\$ 5,207.50	45	10/03/10	10/08/10
Durable Products	3	A1344	5454	Control Panel	\$ 720.00	550	\$ 121,000.00	45	10/05/10	10/14/10
Durable Products	3	A1345	0300	Cover	\$ 3.65	1,470	\$ 5,365.50	45	10/07/10	10/12/10
Durable Products	3	A1346	0300	Gasket	\$ 3.65	1,965	\$ 7,245.25	45	10/05/10	10/11/10
Spacetime Technology	2	A1444	4111	Bolt-nut package	\$ 3.55	4,250	\$ 15,007.50	25	09/20/10	10/10/10
Spacetime Technology	2	A1445	4111	Bolt-nut package	\$ 3.55	4,200	\$ 14,910.00	25	09/25/10	10/25/10
Spacetime Technology	2	A1449	4111	Bolt-nut package	\$ 3.55	4,800	\$ 16,930.00	25	10/05/10	10/19/10
Durable Products	3	A1450	5454	Control Panel	\$ 720.00	500	\$ 110,000.00	45	10/15/10	10/20/10
Durable Products	3	A1457	4509	Bolt-nut package	\$ 3.50	3,800	\$ 13,250.00	45	10/05/10	10/19/10
Durable Products	3	A1587	1289	Airframe fasteners	\$ 4.20	15,000	\$ 63,000.00	45	09/25/10	09/30/10

order, vendor's accounts payable terms, order date, and actual arrival date for each order.

Prepare a recommendation of how you can use the data in this spreadsheet database to improve your decisions about selecting suppliers. Some criteria to consider for identifying preferred suppliers include the supplier's track record for on-time deliveries, suppliers offering the best accounts payable terms, and suppliers offering lower pricing when the same item can be provided by multiple suppliers. Use your spreadsheet software to prepare reports to support your recommendations.

Achieving Operational Excellence: Using Internet Software to Plan Efficient Transportation Routes

In this exercise, you will use the same online software tool that businesses use to map out their transportation routes and select the most efficient route. The MapQuest (www.mapquest.com) Web site includes interactive capabilities for planning a trip. The software on this Web site can calculate the distance between two points and provide itemized driving directions to any location.

You have just started working as a dispatcher for Cross-Country Transport, a new trucking and delivery service based in Cleveland, Ohio. Your first assignment is to plan a delivery of office equipment and furniture from Elkhart, Indiana (at the corner of E. Indiana Ave. and Prairie Street) to Hagerstown, Maryland (corner of Eastern Blvd. N. and Potomac Ave.). To guide your trucker, you need to know the most efficient route between the two cities. Use MapQuest to find the route that is the shortest distance between the two cities. Use MapQuest again to find the route that takes the least time. Compare the results. Which route should Cross-Country use?

LEARNING TRACK MODULES

The following Learning Tracks provide content relevant to topics covered in this chapter:

1. Systems from a Functional Perspective
2. IT Enables Collaboration and Teamwork
3. Challenges of Using Business Information Systems
4. Organizing the Information Systems Function

Review Summary

1. *What are business processes? How are they related to information systems?*

A business process is a logically related set of activities that defines how specific business tasks are performed, and it represents a unique way in which an organization coordinates work, information, and knowledge. Managers need to pay attention to business processes because they determine how well the organization can execute its business, and they may be a source of strategic advantage. There are business processes specific to each of the major business functions, but many business processes are cross-functional. Information systems automate parts of business processes, and they can help organizations redesign and streamline these processes.

2. *How do systems serve the different management groups in a business?*

Systems serving operational management are transaction processing systems (TPS), such as payroll or order processing, that track the flow of the daily routine transactions necessary to conduct business. Management information systems (MIS) produce reports serving middle management by condensing information from TPS, and these are not highly analytical. Decision-support systems (DSS) support management decisions that are unique and rapidly changing using advanced analytical models. All of these types of systems provide business intelligence that helps managers and enterprise employees make more informed decisions. These systems for business intelligence serve multiple levels of management, and include executive support systems (ESS) for senior management that provide data in the form of graphs, charts, and dashboards delivered via portals using many sources of internal and external information.

3. *How do systems that link the enterprise improve organizational performance?*

Enterprise applications are designed to coordinate multiple functions and business processes. Enterprise systems integrate the key internal business processes of a firm into a single software system to improve coordination and decision making. Supply chain management systems help the firm manage its relationship with suppliers to optimize the planning, sourcing, manufacturing, and delivery of products and services. Customer relationship management (CRM) systems coordinate the business processes surrounding the firm's customers. Knowledge management systems enable firms to optimize the creation, sharing, and distribution of knowledge. Intranets and extranets are private corporate networks based on Internet technology that assemble information from disparate systems. Extranets make portions of private corporate intranets available to outsiders.

4. *Why are systems for collaboration and teamwork so important and what technologies do they use?*

Collaboration is working with others to achieve shared and explicit goals. Collaboration and teamwork have become increasingly important in business because of globalization, the decentralization of decision making, and growth in jobs where interaction is the primary value-adding activity. Collaboration is believed to enhance innovation, productivity, quality, and customer service. Effective collaboration today requires a supportive organizational culture as well as information

systems and tools for collaborative work. Collaboration tools include e-mail and instant messaging, wikis, videoconferencing systems, virtual worlds, social networking systems, cell phones, and Internet collaboration platforms such as Google Apps/Sites, Microsoft SharePoint, and Lotus Notes.

5. What is the role of the information systems function in a business?

The information systems department is the formal organizational unit responsible for information technology services. It is responsible for maintaining the hardware, software, data storage, and networks that comprise the firm's IT infrastructure. The department consists of specialists, such as programmers, systems analysts, project leaders, and information systems managers, and is often headed by a CIO.

Key Terms

Business intelligence, 49

Chief information officer (CIO), 68

Chief knowledge officer (CKO), 69

Chief privacy officer (CPO), 69

Chief security officer (CSO), 68

Collaboration, 56

Customer relationship management (CRM) systems, 53

Decision-support systems (DSS), 48

Digital dashboard, 50

Electronic business (e-business), 55

Electronic commerce (e-commerce), 55

E-government, 55

End users, 69

Enterprise applications, 51

Enterprise systems, 51

Executive support systems (ESS), 50

Information systems department, 68

Information systems managers, 68

Interorganizational system, 53

IT governance, 69

Knowledge management systems (KMS), 54

Management information systems (MIS), 47

Portal, 50

Programmers, 68

Supply chain management (SCM) systems, 53

Systems analysts, 68

Teams, 56

Telepresence, 61

Transaction processing systems (TPS), 45

Review Questions

- What are business processes? How are they related to information systems?
 - Define business processes and describe the role they play in organizations.
 - Describe the relationship between information systems and business processes.
- How do systems serve the various levels of management in a business?
 - Describe the characteristics of transaction processing systems (TPS) and the roles they play in a business.
 - Describe the characteristics of management information systems (MIS) and explain how MIS differ from TPS and from DSS.
 - Describe the characteristics of decision-support systems (DSS) and how they benefit businesses.
- Describe the characteristics of executive support systems (ESS) and explain how these systems differ from DSS.
- How do systems that link the enterprise improve organizational performance?
 - Explain how enterprise applications improve organizational performance.
 - Define enterprise systems, supply chain management systems, customer relationship management systems, and knowledge management systems and describe their business benefits.
 - Explain how intranets and extranets help firms integrate information and business processes.
- Why are systems for collaboration and teamwork so important and what technologies do they use?

- Define collaboration and teamwork and explain why they have become so important in business today.
 - List and describe the business benefits of collaboration.
 - Describe a supportive organizational culture and business processes for collaboration.
 - List and describe the various types of collaboration and communication systems.
5. What is the role of the information systems function in a business?
 - Describe how the information systems function supports a business.
 - Compare the roles played by programmers, systems analysts, information systems managers, the chief information officer (CIO), chief security officer (CSO), and chief knowledge officer (CKO).

Discussion Questions

1. How could information systems be used to support the order fulfillment process illustrated in Figure 2-1? What are the most important pieces of information these systems should capture? Explain your answer.
2. Identify the steps that are performed in the process of selecting and checking out a book from your college library and the information that flows among these activities. Diagram the process. Are there any ways this process could be improved to improve the performance of your library or your school? Diagram the improved process.
3. How might the BMW Oracle team have used collaboration systems to improve the design and performance of the America's Cup sailboat USA? Which system features would be the most important for these tasks?

Video Cases

Video Cases and Instructional Videos illustrating some of the concepts in this chapter are available. Contact your instructor to access these videos.

Collaboration and Teamwork: Describing Management Decisions and Systems

With a team of three or four other students, find a description of a manager in a corporation in *BusinessWeek*, *Fortune*, *The Wall Street Journal*, or another business publication or do your research on the Web. Gather information about what the manager's company does and the role he or she plays in the company. Identify the organizational level and business function where this manager works. Make a list of the kinds of decisions this manager has to make

and the kind of information the manager would need for those decisions. Suggest how information systems could supply this information. If possible, use Google Sites to post links to Web pages, team communication announcements, and work assignments. Try to use Google Docs to develop a presentation of your findings for the class.

Collaboration and Innovation at Procter & Gamble

CASE STUDY

Look in your medicine cabinet. No matter where you live in the world, odds are that you'll find many Procter & Gamble products that you use every day. P&G is the largest manufacturer of consumer products in the world, and one of the top 10 largest companies in the world by market capitalization. The company is known for its successful brands, as well as its ability to develop new brands and maintain its brands' popularity with unique business innovations. Popular P&G brands include Pampers, Tide, Bounty, Folgers, Pringles, Charmin, Swiffer, Crest, and many more. The company has approximately 140,000 employees in more than 80 countries, and its leading competitor is Britain-based Unilever. Founded in 1837 and headquartered in Cincinnati, Ohio, P&G has been a mainstay in the American business landscape for well over 150 years. In 2009, it had \$79 billion in revenue and earned a \$13.2 billion profit.

P&G's business operations are divided into three main units: Beauty Care, Household Care, and Health and Well-Being, each of which are further subdivided into more specific units. In each of these divisions, P&G has three main focuses as a business. It needs to maintain the popularity of its existing brands, via advertising and marketing; it must extend its brands to related products by developing new products under those brands; and it must innovate and create new brands entirely from scratch. Because so much of P&G's business is built around brand creation and management, it's critical that the company facilitate collaboration between researchers, marketers, and managers. And because P&G is such a big company, and makes such a wide array of products, achieving these goals is a daunting task.

P&G spends 3.4 percent of revenue on innovation, which is more than twice the industry average of 1.6 percent. Its research and development teams consist of 8,000 scientists spread across 30 sites globally. Though the company has an 80 percent "hit" rate on ideas that lead to products, making truly innovative and groundbreaking new products is very difficult in an extremely competitive field like consumer products. What's more, the creativity of bigger companies like P&G has been on the decline, with the top consumer goods companies accounting for only 5 per-

cent of patents filed on home care products in the early 2000s.

Finding better ways to innovate and develop new ideas is critical in a marketplace like consumer goods, and for any company as large as P&G, finding methods of collaboration that are effective across the enterprise can be difficult. That's why P&G has been active in implementing information systems that foster effective collaboration and innovation. The social networking and collaborative tools popularized by Web 2.0 have been especially attractive to P&G management, starting at the top with former CEO A.G. Lafley. Lafley was succeeded by Robert McDonald in 2010, but has been a major force in revitalizing the company.

When Lafley became P&G's CEO in 2000, he immediately asserted that by the end of the decade, the company would generate half of its new product ideas using sources from outside the company, both as a way to develop groundbreaking innovations more quickly and to reduce research and development costs. At the time, Lafley's proclamation was considered to be visionary, but in the past 10 years, P&G has made good on his promise.

The first order of business for P&G was to develop alternatives to business practices that were not sufficiently collaborative. The biggest culprit, says Joe Schueller, Innovation Manager for P&G's Global Business Services division, was perhaps an unlikely one: e-mail. Though it's ostensibly a tool for communication, e-mail is not a sufficiently collaborative way to share information; senders control the flow of information, but may fail to send mail to colleagues who most need to see it, and colleagues that don't need to see certain e-mails will receive mailings long after they've lost interest. Blogs and other collaborative tools, on the other hand, are open to anyone interested in their content, and attract comments from interested users.

However, getting P&G employees to actually use these newer products in place of e-mail has been a struggle for Schueller. Employees have resisted the changes, insisting that newer collaborative tools represent more work on top of e-mail, as opposed to a better alternative. People are accustomed to e-mail, and there's significant organizational inertia against switching to a new way of doing things. Some P&G

processes for sharing knowledge were notoriously inefficient. For instance, some researchers used to write up their experiments using Microsoft Office applications, then print them out and glue them page by page into notebooks. P&G was determined to implement more efficient and collaborative methods of communication to supplant some of these outdated processes.

To that end, P&G launched a total overhaul of its collaboration systems, led by a suite of Microsoft products. The services provided include unified communications (which integrates services for voice transmission, data transmission, instant messaging, e-mail, and electronic conferencing), Microsoft Live Communications Server functionality, Web conferencing with Live Meeting, and content management with SharePoint. According to P&G, over 80,000 employees use instant messaging, and 20,000 use Microsoft Outlook, which provides tools for e-mail, calendaring, task management, contact management, note taking, and Web browsing. Outlook works with Microsoft Office SharePoint Server to support multiple users with shared mailboxes and calendars, SharePoint lists, and meeting schedules.

The presence of these tools suggests more collaborative approaches are taking hold. Researchers use the tools to share the data they've collected on various brands; marketers can more effectively access the data they need to create more highly targeted ad campaigns; and managers are more easily able to find the people and data they need to make critical business decisions.

Companies like P&G are finding that one vendor simply isn't enough to satisfy their diverse needs. That introduces a new challenge: managing information and applications across multiple platforms. For example, P&G found that Google search was inadequate because it doesn't always link information from within the company, and its reliance on keywords for its searches isn't ideal for all of the topics for which employees might search. P&G decided to implement a new search product from start-up Connectbeam, which allows employees to share bookmarks and tag content with descriptive words that appear in future searches, and facilitates social networks of coworkers to help them find and share information more effectively.

The results of the initiative have been immediate. For example, when P&G executives traveled to meet with regional managers, there was no way to integrate all the reports and discussions into a single document. One executive glued the results of experiments into Word documents and passed them out at

a conference. Another executive manually entered his data and speech into PowerPoint slides, and then e-mailed the file to his colleagues. One result was that the same file ended up in countless individual mailboxes. Now, P&G's IT department can create a Microsoft SharePoint page where that executive can post all of his presentations. Using SharePoint, the presentations are stored in a single location, but are still accessible to employees and colleagues in other parts of the company. Another collaborative tool, InnovationNet, contains over 5 million research-related documents in digital format accessible via a browser-based portal. That's a far cry from experiments glued in notebooks.

One concern P&G had when implementing these collaborative tools was that if enough employees didn't use them, the tools would be much less useful for those that did use them. Collaboration tools are like business and social networks—the more people connect to the network, the greater the value to all participants. Collaborative tools grow in usefulness as more and more workers contribute their information and insights. They also allow employees quicker access to the experts within the company that have needed information and knowledge. But these benefits are contingent on the lion's share of company employees using the tools.

Another major innovation for P&G was its large-scale adoption of Cisco TelePresence conference rooms at many locations across the globe. For a company as large as P&G, telepresence is an excellent way to foster collaboration between employees across not just countries, but continents. In the past, telepresence technologies were prohibitively expensive and overly prone to malfunction. Today, the technology makes it possible to hold high-definition meetings over long distances. P&G boasts the world's largest rollout of Cisco TelePresence technology.

P&G's biggest challenge in adopting the technology was to ensure that the studios were built to particular specifications in each of the geographically diverse locations where they were installed. Cisco accomplished this, and now P&G's estimates that 35 percent of its employees use telepresence regularly. In some locations, usage is as high as 70 percent. Benefits of telepresence include significant travel savings, more efficient flow of ideas, and quicker decision making. Decisions that once took days now take minutes.

Laurie Heltsley, P&G's director of global business services, noted that the company has saved \$4 for every \$1 invested in the 70 high-end telepresence systems it has installed over the past few years.

These high-definition systems are used four times as often as the company's earlier versions of videoconferencing systems.

Sources: Joe Sharkey, "Setbacks in the Air Add to Lure of Virtual Meetings," *The New York Times*, April 26, 2010; Matt Hamblen, "Firms Use Collaboration Tools to Tap the Ultimate IP-Worker Ideas," *Computerworld*, September 2, 2009; "Computerworld Honors Program: P&G", 2008; www.pg.com, accessed May 18, 2010; "Procter & Gamble Revolutionizes Collaboration with Cisco TelePresence," www.cisco.com, accessed May 18, 2010; "IT's Role in Collaboration at Procter & Gamble," *Information Week*, February 1, 2007.

CASE STUDY QUESTIONS

1. What is Procter & Gamble's business strategy? What is the relationship of collaboration and innovation to that business strategy?
2. How is P&G using collaboration systems to execute its business model and business strategy? List and describe the collaboration systems and technologies it is using and the benefits of each.
3. Why were some collaborative technologies slow to catch on at P&G?
4. Compare P&G's old and new processes for writing up and distributing the results of a research experiment.
5. Why is telepresence such a useful collaborative tool for a company like P&G?
6. Can you think of other ways P&G could use collaboration to foster innovation?